

Everything You Always Wanted to Know About Sewer Gas...But Were Afraid to Ask

Question: What is sewer gas?

Answer: Sewer gas, at least that which causes an odor problem to the occupants of a house, is a mixture of inorganic gases created by the action of anaerobic (needing no oxygen) bacteria on sewage and sludge. This gas can contain hydrogen sulfide, ammonia, carbon dioxide, methane, nitrogen, and hydrogen.

Question: What makes it smell so bad?

Answer: Almost always, hydrogen sulfide is the odor culprit, although ammonia may be formed in rare cases. The rest of the gases listed above are odorless. The odor threshold, the lowest concentration that can be detected with the nose, for hydrogen sulfide is somewhere between .001 and .01 parts per million (ppm), an extremely low concentration. As an illustration, 1 ppm on a linear scale is one inch in 15.8 miles.

Question: Can these gases harm the people who come into contact with them?

Answer: Only under extremely unusual circumstances. Although hydrogen sulfide is a toxic gas, it will not harm people at the concentrations that exist in a house with sewer gas odor problems. Studies have shown that hydrogen sulfide has a depressant effect on the central nervous system in concentrations above 150 ppm. This is 15,000 to 150,000 times the amount detectable by most people. Not enough gas is generated in the sewers for concentrations to approach the dangerous level in the dwelling.

However, if a person were to enter a tunnel or deep hole that contained sewage undergoing anaerobic breakdown, there is a chance he could become poisoned.

Question: How does it get into the house?

Answer: The only way sewer gas can get into a home is if there is something wrong with your plumbing. The most common fault in the plumbing system is untrapped drains, especially floor drains in the basement or utility room. Since 1970, the City of Marion has had a plumbing inspection program and any houses built after that year should have no problem with a lack of traps. If your house is older than that, your floor drains may or may not be trapped.

Other ways sewer gas can get into your home include:

1. A dry trap. If there is a trap in a drain line that is not often used, the water in the trap may evaporate, breaking the trap seal.
2. A damaged trap. Obviously, if the trap is cracked and allows the water to run out, the trap seal is again lost.
3. A damaged drain line. If the drain line is cracked or broken between the main sewer and the trap, there is nothing to impede the flow of gases through the crack or break in the line. Also, a damaged drain line may allow sewage to drain into the basement or crawlspace under your house, and you may get a sewer odor from that accumulation of sewer.
4. A damaged or plugged vent. The vent system in your plumbing is designed to equalize the atmospheric pressure differences caused by wastewater flowing through the plumbing, and also to allow sewer gases to escape the plumbing system by venting them into the atmosphere above the house. If this system has an untrapped opening inside your house, gases may escape through that opening.

If the vent is plugged or absent, those unequal pressures it was designed to eliminate may siphon the water out of the trap to such an extent as to ruin the trap seal.

Question: How is it produced in the sewer?

Answer: Hydrogen sulfide (H_2S) is produced when the sulfate radical (SO_4) is reduced to H_2S and H_2O (water). This reaction can take place only when there is no oxygen or other oxidants in the microbial environment. Studies have shown that H_2S is not produced in fresh wastewater for two or three days, by which time it is normally to or through the wastewater treatment plant.

There are, however, some environments where hydrogen sulfide is produced in the sewers:

1. The slime layer that coats the sewer pipe below the water line. Although this layer can be only .040 of an inch thick, the three-quarters of the layer closest to the sewer pipe is so oxygen-poor that H_2S is commonly formed.
2. If any sludge has been deposited at the bottom of the pipe, H_2S will also be formed in that sludge.
3. If there is a problem in the sewer with flow (if it is plugged or partially plugged) so that the sewage cannot keep moving, the oxygen content gets to low that H_2S can be produced in the sewage itself.

An important point to remember is that all sewage systems, at one time or another, produce sewer gas.

Question: *What can be done to keep it from being formed in the sewers?*

Answer: If the hydrogen sulfide is becoming a problem in a very localized area (for example at the treatment plant or at a lift station), oxidizers can be added to the sewage to increase the oxidation-reduction potential. These oxidizers can be oxygen, hydrogen peroxide, chlorine, permanganates, and others.

If the problem is in part of the sewage collection system, about all that can be practically done is to flush the sewers in order to increase the flow rate and remove any sediments or obstructions. However, this can only be done to alleviate acute problems, and is not practical on a continuous basis.

Question: *What can I do to keep odors out of the house?*

Answers: The best answer is to find the problem with the plumbing system and have it repaired. If the floor drains are untrapped, have traps installed. It is probably not wise to simply plug the drain, because any water that enters the basement or utility room will have no place to go and possibly flood the room. In any case, an experienced plumber will be able to find the shortcomings of the system and offer suggestions on how to correct them on an individual basis.

Question: *What, exactly, is a trap?*

Answer: A trap is a device made from a U-shaped section of pipe, tubing or tile which traps wastewater. This wastewater then acts as a seal to prevent sewer gases from coming out through the drain opening.

Question: *How can I tell if my floor drains are trapped?*

Answer: Pour water into the opening (at least 2 gallons) and visually inspect by looking down the opening. If there is considerable water standing (so that it fills the pipe), then the drain is trapped. Check it again a couple of hours later to be sure the water hasn't drained out.

If there is no standing water, then either there is no trap or it is located somewhere else in the line. If there are odors present, pour some water into the opening and check for odors about an hour later. If the odors are still present, there is probably no trap.